

CLAIMS:

1. An aircraft defueling apparatus, comprising:
 - a vacuum fuel tank comprising a first vacuum generator;
 - a first defueling hose in fluid communication with the vacuum fuel tank;
 - a first defueling fitting attached to the first defueling hose;
 - a second vacuum generator operatively connected to the first defueling fitting.

2. An aircraft defueling apparatus according to claim 1, further comprising:
 - a second defueling hose in fluid communication with the vacuum fuel tank;
 - a second defueling fitting attached to the second defueling hose;
 - a third vacuum generator operatively connected to the second defueling fitting.

3. An aircraft defueling apparatus according to claim 1, further comprising:
 - a second defueling hose in fluid communication with the vacuum fuel tank;
 - a second defueling fitting attached to the second defueling hose;
 - a third vacuum generator operatively connected to the second defueling fitting;
 - a third defueling hose in fluid communication with the vacuum fuel tank;
 - a third defueling fitting attached to the third defueling hose, the third defueling fitting operatively connected to the second vacuum generator.

4. An aircraft defueling apparatus according to claim 1, further comprising:
- a second defueling hose in fluid communication with the vacuum fuel tank;
 - a second defueling fitting attached to the second defueling hose;
 - a third vacuum generator operatively connected to the second defueling fitting;
 - a third defueling hose in fluid communication with the vacuum fuel tank;
 - a third defueling fitting attached to the third defueling hose, the third defueling fitting operatively connected to the second vacuum generator;
 - a fourth defueling hose in fluid communication with the vacuum fuel tank;
 - a fourth defueling fitting attached to the fourth defueling hose, the fourth defueling fitting operatively connected to the third vacuum generator.
5. An aircraft defueling apparatus according to claim 1, further comprising:
- a collection chamber disposed at least partially in the vacuum fuel tank;
 - an angled fuel flow disbursement tube in fluid communication with the collection chamber for preventing fluid freefall of fuel collected in the collection chamber to a bottom portion of the vacuum fuel tank.
6. An aircraft defueling apparatus according to claim 1, further comprising:
- a collection chamber disposed at least partially in the vacuum fuel tank;
 - a fuel flow disbursement tube angled at least 10 degrees with respect to vertical in fluid communication with the collection chamber for preventing fluid freefall of fuel collected in the collection chamber to a bottom portion of the vacuum fuel tank.

7. An aircraft defueling apparatus according to claim 1, further comprising a telescoping funnel attached to and extending at least partially through the vacuum fuel tank.

8. An aircraft defueling apparatus according to claim 1, further comprising:
a telescoping funnel attached to and extending at least partially through the vacuum fuel tank;
a valve assembly in fluid communication with the telescoping funnel for isolating the telescoping funnel from the vacuum fuel tank.

9. An aircraft defueling apparatus according to claim 1, further comprising:
a telescoping funnel attached to and extending at least partially through the vacuum fuel tank;
a valve assembly in fluid communication with the telescoping funnel for isolating the telescoping funnel from the vacuum fuel tank;
wherein the valve assembly comprises a first valve for isolating the telescoping funnel from the vacuum fuel tank and a second valve for selectively directing fluid flow from the vacuum fuel tank through a vacuum fuel tank drain port.

10. An aircraft defueling apparatus according to claim 1, further comprising:
- a telescoping funnel attached to and extending at least partially through the vacuum fuel tank;
 - a valve assembly in fluid communication with the telescoping funnel;
 - wherein the valve assembly comprises:
 - a first elbow tapped transversely into a base of the telescoping funnel and extending outside of the vacuum fuel tank;
 - a first valve downstream of the first elbow and outside of the vacuum fuel tank for selectively isolating the telescoping funnel from the vacuum fuel tank and fluidly connecting the telescoping funnel to the vacuum fuel tank;
 - a second valve downstream of the first valve for selectively draining the vacuum fuel tank.

11. An aircraft defueling apparatus according to claim 1, further comprising:
a telescoping funnel attached to and extending at least partially through the vacuum fuel tank;
a valve assembly in fluid communication with the telescoping funnel;
wherein the valve assembly comprises:
a first elbow tapped transversely into a base of the telescoping funnel and extending outside of the vacuum fuel tank;
a first valve downstream of the first elbow and outside of the vacuum fuel tank for selectively isolating the telescoping funnel from the vacuum fuel tank and fluidly connecting the telescoping funnel to the vacuum fuel tank;
a second valve downstream of the first valve for selectively draining the vacuum fuel tank;
a return fitting downstream of the first valve extending into the vacuum fuel tank and fluidly connecting the first and second valves to the vacuum fuel tank.

12. A mobile fuel bowser, comprising:
a holding tank;
a vacuum assembly integral with and at least partially inserted into the holding tank, the vacuum assembly, when operated, placing the holding tank in vacuum;
one or more hoses in fluid communication with the holding tank.

13. A mobile fuel bowser according to claim 12, further comprising:
- a defueling fitting attached to each of the one or more hoses, the defueling fitting comprising a suction cup;
 - a vacuum line extending between the suction cup and the vacuum assembly for providing suction to the suction cup.
14. A mobile fuel bowser according to claim 12, further comprising:
- a defueling fitting attached to each of the one or more hoses, the defueling fitting comprising a suction cup;
 - a vacuum line extending between the suction cup and the vacuum assembly for providing suction to the suction cup;
 - wherein the suction cup comprises:
 - a rigid plate with a drain port attached to one of the one or more hoses;
 - a second hole in the rigid plate attached to the vacuum line;
 - wherein the drain hole and the second hole are isolated from one another by one or more seals.
15. A mobile fuel bowser according to claim 12 wherein the vacuum assembly comprises at least two vacuum generators.

16. A mobile fuel bowser according to claim 12, further comprising:

- a defueling fitting attached to each of the one or more hoses, the defueling fitting comprising a suction cup;
- a vacuum line extending between the suction cup and the vacuum assembly for providing suction to the suction cup;
- wherein the vacuum assembly comprises at least two vacuum generators, wherein a first of the at least two vacuum generators is operatively connected to the one or more hoses via the holding tank, and a second of the at least two vacuum generators is operatively connected to the suction cup via the vacuum line.

17. A mobile fuel bowser according to claim 12, further comprising:

- at least two hoses;
- a defueling fitting attached to each of the at least two hoses, the defueling fitting comprising a suction cup;
- a first vacuum line extending between the suction cup of a first of the at least two hoses and a second vacuum line extending between the suction cup of a second of the at least two hoses and the vacuum assembly for providing suction to the suction cup;
- wherein the vacuum assembly comprises at least three vacuum generators, wherein a first of the at least three vacuum generators is operatively connected to the at least two hoses via the holding tank, a second of the at least three vacuum generators is operatively connected to the suction cup of the first of the at least two hoses via the first vacuum line, and a third of the at least three vacuum generators is operatively connected to the suction cup of the second of the at least two hoses via the second vacuum line.

18. A mobile fuel bowser according to claim 12, further comprising:
- a telescoping funnel attached to and extending at least partially through the holding tank;
 - a valve assembly in fluid communication with the telescoping funnel for selectively fluidly isolating the telescoping funnel from the holding tank to maintain the vacuum in the holding tank;
19. A defueling apparatus, comprising:
- a holding tank;
 - a first fuel drain hose in fluid communication with the holding tank;
 - a defueling fitting attached to the first fuel drain hose;
 - a vacuum line attached to the defueling fitting;
 - a first vacuum generator operatively connected to the holding tank for placing the holding tank at a lower pressure than atmosphere;
 - a second vacuum generator operatively connected to the defueling fitting for attaching the defueling fitting to a surface;
 - a telescoping funnel attached to and extending at least partially through the holding tank;
 - a valve assembly in fluid communication with the telescoping funnel for selectively isolating the telescoping funnel from the holding tank to maintain the lower pressure in the holding tank.

20. A defueling apparatus according to claim 19, further comprising:
a second fuel drain hose in fluid communication with the holding tank;
a second defueling fitting attached to the second fuel drain hose;
a second vacuum line attached to the defueling fitting;
a third vacuum generator operatively connected to the second defueling fitting via the second vacuum line for hermetically attaching the defueling fitting to a surface.

21. A method of defueling an aircraft, comprising:
providing a vacuum fuel tank, the vacuum fuel tank including a first vacuum generator;
providing a first defueling hose in fluid communication with the vacuum fuel tank;
providing a first defueling fitting attached to the first defueling hose;
providing a second vacuum generator operatively connected to the first defueling fitting;
opening an aircraft fuel drain;
directing fuel from the aircraft fuel drain through the first defueling hose and into the vacuum fuel tank.

22. A method of defueling an aircraft according to claim 21, further comprising lowering pressure inside the vacuum fuel tank below atmospheric with the first vacuum generator and applying vacuum suction to the first defueling fitting with the second vacuum generator.

23. A method of defueling an aircraft according to claim 21, further comprising:
- lowering pressure inside the vacuum fuel tank below atmospheric with the first vacuum generator and applying vacuum suction to the first defueling fitting with the second vacuum generator
 - providing a telescoping funnel attached to and extending at least partially through the vacuum fuel tank;
 - maintaining lower pressure inside the vacuum fuel tank by fluidly isolating the telescoping funnel from the vacuum fuel tank.
24. A method of defueling an aircraft according to claim 21, further comprising
- providing a second defueling hose in fluid communication with the vacuum fuel tank;
 - providing a second defueling fitting attached to the second defueling hose;
 - providing a third vacuum generator operatively connected to the second defueling fitting.
25. A method of defueling an aircraft comprising:
- attaching a defueling fitting over an aircraft drain valve with vacuum suction generated by a first vacuum source;
 - drawing fuel from the aircraft drain valve and through a vacuum hose attached to the defueling fitting;
 - wherein a vacuum of the vacuum hose is generated by a second vacuum source.

26. A method of defueling an aircraft according to claim 25, further comprising
applying vacuum pressure to a tank connected to the vacuum hose with the second
vacuum source.

27. A method of defueling an aircraft according to claim 25, further comprising
attaching a second defueling fitting over a second aircraft drain valve with vacuum
suction generated by a third vacuum source;
drawing fuel from the second aircraft drain valve and through a second vacuum hose
attached to the second defueling fitting.

28. A method of defueling an aircraft according to claim 25, further comprising:
applying vacuum pressure to a tank connected to the vacuum hose with the second
vacuum source;
filling the tank with fuel via the vacuum hose without allowing fuel entering the tank
to freefall more than 6 inches.

29. A method of defueling an aircraft according to claim 25, further comprising:
applying vacuum pressure to a tank connected to the vacuum hose with the second
vacuum source;
providing a telescoping funnel attached to and extending at least partially through the
tank;
maintaining vacuum pressure inside the tank by fluidly isolating the telescoping
funnel from the tank.

30. A method of defueling an aircraft according to claim 25, further comprising isolating vacuum suction generated by the first vacuum source from vacuum hose pressure with a circumferential seal disposed in the defueling fitting.